and second transport blocks to a physical layer, and transmitting the first and second transport blocks to a receiving system after attaching a cyclic redundancy check to each of the first and second transport blocks.

[0016] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The invention will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:

[0018] **FIG. 1** illustrates a method of data processing between OSI layers according to the prior art;

[0019] **FIG. 2** illustrates a structure of a protocol data unit (PDU) having an unacknowledged mode data (UMD) according to the prior art;

[0020] **FIG. 3** illustrates a structure of a protocol data unit (PDU) having an acknowledged mode data (AMD) according to the prior art;

[0021] **FIG. 4** illustrates a method of data processing between OSI layers according to the present invention;

[0022] **FIG. 5** illustrates a structure of a protocol data unit (PDU) having an unacknowledged mode data (UMD) according to the present invention; and

[0023] **FIG. 6** illustrates a structure of a protocol data unit (PDU) having an acknowledged mode data (AMD) according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0024] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[0025] **FIG. 4** illustrates a method of data processing between open system interconnection (OSI) layers according to the present invention. Once a radio bearer is set, sizes and modes of protocol data units (PDU) of radio link control (RLC) and media access control (MAC) layers, a logical channel, a transport channel, and a physical channel are determined. The structure of each RLC PDU depends on whether the RLC is set to an acknowledged mode or an unacknowledged mode, and each PDU initially has a size of an arbitrary number, N octet units.

[0026] After all the parameters are determined, one or more RLC SDUs received from a higher layer are segmented into a appropriate size set by the radio bearer and/or concatenated to form a RLC payload unit (RLC PU). Each PU is then divided into two independent PDUs: a first PDU (SN PDU) including a sequence number (SN) corresponding to the PU and an extension (E) field and the other PDU (LI+PU PDU) including the PU, one or more length indicators (LI), and one ore more extension (E) fields. The SN PDU contains the SN and E field if the RLC is set to an unacknowledged mode in which it is not required to transmit an acknowledgement signal to an originating system after a set of PDUs are transmitted, and it further contains a data/control (D/C), a polling (P), and a header extension (HE) field if the RLC is set to an acknowledged mode in which it is required to transmit the acknowledgement signal to the originating system.

[0027] The SN represents an order number of each RLC PDU shown in **FIG. 2** or **FIG. 3** and has its size of 7 bits for a PDU containing an unacknowledged mode data (UMD PDU) and 12 bits for a PDU containing an acknowledged mode data (AMD PDU). The LI forms boundaries between the SDUs if a PDU has more than one SDU and has its size of 7 bits or 15 bits. The E field indicates whether the next field is a data or LI/E field and has a size of one bit. The data/control (D/C) field indicates whether the corresponding PDU contains data or control information. The P field is used when requesting a receiving system to send a status report and has a size of one bit. The HE field indicates whether its next field is data or LI/E field and has its size of two bits. The PU consists of data and the PAD field or a piggyback status PDU field. The LI+PU PDU has a variable length in octet units depending upon the length of the LI or PU, but the SN PDU has a fixed length (one or two octets).

[0028] The SN PDU and the LI+PU PDU get transmitted to a MAC layer through a pair of different logical channels. When a predetermined time period is elapsed after a SN PDU is transmitted through a specific logical channel, the corresponding LI+PU PDU is transmitted through another logical channel. A switching function is used in the logical channel in order to send both PDUs in different channels. For example, in order to continuously keep switching between a channel **#1** and channel **#2** for transmitting the SN PDU and the LI+PU PDU, respectively, the RLC layer must have a logical channel function.

[0029] The MAC layer considers both transmitted PDUs as a single data unit and produces a transport block (TB) for each PDU after attaching a MAC header if necessary (optional). Each TB represents a MAC PDU. Similarly, the TBs produced get transmitted to a physical layer through a pair of different transport channels, so the MAC layer needs to have a transport channel switching function similar to the logical channel switching function used in the logical channel. When a predetermined time period is elapsed after a TB containing the SN is transmitted to a physical layer through a transport channel, the other TB containing the PU corresponding to the SN is transmitted through another transport channel. Therefore, the physical layer can receive information regarding the SNs even before the corresponding data are transmitted. Then each TB is attached to a cyclic redundancy check (CRC) in the physical layer for detecting errors and transmitted to the receiving system. Thereafter, the receiving system extracts high layer data from the data received from the physical layer by inversely going through the steps shown in **FIG. 4** and transmits it to its high layer.

[0030] **FIG. 5** and **FIG. 6** illustrate structures of protocol data units (PDU) having an unacknowledged mode data (UMD) and an acknowledge mode data (AMD), respectively, according to the present invention. As it can be seen from both figures, the structures of SN PDUs depend upon whether the RLC is set to an unacknowledged mode or an acknowledged mode. In other words, each PDU divided into two independent PDUs: a PDU that includes a SN corresponding to the original (before division) PDU and the other PDU that doesn't. The SN PDU contains a SN and E if the